Updated green vegetation fraction data for use in WRF

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Climatic changes and extreme events such as heat waves and droughts alter the seasonal variation of vegetation canopies. This change in turn, influence regional weather and climate through modification of the surface energy balance, leading to changes in regional temperature and moisture fields. Climate change studies indicate that the occurrance of heat waves and above-average high temperatures during summer months in Europe will increase in the coming decades which inevitable will lead to modifications of the vegetation canopy. In the last decade, at least three occurrances of heat waves in Europe have been confirmed.

The weather research and forecasting (WRF) model use green vegetation fraction (f_g) as a dynamic tool to represent vegetation phenology. The current f_g data was derived from the AVHRR satellite data during 1986 - 1991 with spatial resolution of 0.144° degrees and monthly temporal resolution. Hence, the data cannot represent recent changes in land use and impacts on vegetation on weekly or bi-weekly scale from extreme events.

We derived a new multi-year green vegetation fraction (f_g) climatology from recent MODIS NDVI data with high spatial and temporal resolution. Furthermore, two annual representations of f_g during the heat wave year of 2006 was produced using linear and quadratic formulations of f_g to investigate the performances in a regional climate simulation over Europe during 2006. The simulations are compared to a control run using the default climatology in WRF. Additionally, we include comparison of f_g scaled parameters such as leaf area index, roughness and emissivity. To access the impact from using different f_g data on temperature and moisture, we use the E-OBS gridded data. The results show that extreme events require updated vegetation conditions in order to improve numerical simulations.